

University of Bahrain  
College of Information Technology  
Department of Computer Science  
Semester 2, 2014-2015  
ITCS104/ ITCS112 (Computer Programming II)

Serial  
Number:

TEST 2

Date: 6<sup>th</sup> May 2015

Time: 4:00pm - 5:15pm

STUDENT NAME	key
STUDENT ID	
SECTION #	

QUESTION #	MARKS		COMMENTS
Q.1	7		
Q.2	10		
Q.3	7		
Q.4	10		
Q.5	6		
<b>TOTAL</b>	<b>40</b>		

### Question 1 [ 7 points ]

Show the output of the following C++ program:

<pre>class Test{ private:     int x;    static int q;  public:     void setX(int a) { x = a; }      void print( ){ cout&lt;&lt;x&lt;&lt;" "&lt;&lt;q&lt;&lt;endl; }      Test(int a=0){ x=a; }      static void changeQ( ) { q++; } };  int Test::q=5;  int main( ) {     Test A(10), B;      A.print( );      B.print( );      Test::changeQ( );      A.print( );      B.print( );      Test * ptr = new Test;      ptr-&gt;setX(20);      ptr-&gt;changeQ( );      A.print( );      B.print( );      (*ptr).print( );      return 0; }</pre>	<p style="text-align: center;"><b><u>OUTPUT</u></b></p> <pre>10  5 0   5 10  6 0   6 10  7 0   7 20  7</pre>
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## **Question 2 | 10 points |**

Create a class named **Airplane**, with the following data members:

- **name:** to represent the airplane name, for example “Airbus”, “Boeing”, etc. The default value is “Airbus”.
- **capacity:** to represent the maximum number of passengers of the airplane. The capacity value must be a positive number with default value 200;
- **speed:** to represent the airplane speed in Km/Hour. The speed must be a positive number with default value 600.

**The class should include the following member functions:**

1. Default constructor (i.e. constructor without parameters) .
2. Destructor function.
3. One set function to set all data members.
4. One get function to return the values of all data members.
5. Print function.

**Note:** Declare the class only, don't include the member functions implementation.

```
class Airplane
{
private:
    string name;
    int capacity;
    int speed;
public:

    Airplane();
    ~Airplane();
    void setAirplane(string, int, int);
    void getAirplane(string&,int&,int&);
    void printAirplane( );
};
```

### **Question 3 [ 7 points ]**

Write the definition (Implementation) of the functions defined in Question.2

(1) *get function*

(2) *set function (make sure to validate data members)*

```
void Airplane::getAirplane(string &n, int &c, int &s)
```

```
{
```

```
    n=name;
```

```
    c=capacity;
```

```
    s=speed=s;
```

```
}
```

```
void Airplane::setAirplane(string n, int c, int s)
```

```
{
```

```
    name=n;
```

```
    if(c>0) capacity=c; else capacity=200;
```

```
    if(s>0) speed=s;  else speed=600;
```

```
}
```

#### **Question 4 | 10 points |**

Write a function named **countAirbus** that takes as parameters: a pointer to 2D array of type **Airplane**, the number of rows, and the number of columns.

The function should count and output the number of “Airbus” planes in each row of the array.

The function prototype is:

*void countAirbus(Airplane \*\* list, int nRows, int nCols)*

```
void countAirbus(Airplane ** list, int nRows, int nCols)
{

    string n; int c; int s;

    for(int i=0; i<nRows; i++)
    {

        int count = 0;

        for(int j=0; j<nCols; j++)
        {
            list[i][j].getAirplane(n,c,s);

            if ( n == "Airbus")
            {
                count++;
            }
        }

        cout<<"The number of airbus planes = "<< count <<endl;
    }

}
```

### **Question 5 | 6 points |**

Write a main function to test the function **countAirbus** as follows:

1. Create 2D dynamic array of type **Airplane** of size N X 3. Where N is the number of rows and it should be entered by the user and 3 is the number of columns.
2. Prompt the user to enter name, capacity and speed for each airplane in the array.
3. Call the function **countAirbus** to display the number of “Airbus” planes in each row.
4. Delete the 2D dynamic array.

```
Airplane **list;    int nRows;    int nCols = 2;

cout<<"Enter number of rows (airlines)";
cin>>nRows;

list = new Airplane*[nRows];

for(int i=0; i<nRows; i++)
    list[i] = new Airplane[nCols];

string n; int c; int s;
for(int i=0; i<nRows; i++)
    for(int j=0; j<nCols; j++)
    {
        cout<<"Enter airplane data:";
        cin>>n>>c>>s;

        list[i][j].setAirplane(n,c,s);
    }

countAirbus(list, nRows, nCols);

for(int i=0; i<nRows; i++)
    delete [] list[i];

delete [] list;

system("pause");
return 0;
}
```